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# TRANSMITTAL FORM

(to be used for all correspondence after initial filing)

Application Number

10/046,499

Filing Date

October 26, 2001

First Named Inventor

Werner G. Kuhr

Group Art Unit

1745

Examiner Name

Gregg Cantelmo

Total Number of Pages in This Submission

Attorney Docket Number

407T-103300US

## ENCLOSURES (check all that apply)

- ☐ Fee Transmittal Form
  - ☐ Fee Attached
- ☐ Amendment / Response
  - ☐ After Final
  - ☐ Affidavits/declaration(s)
- ☐ Extension of Time Request
- ☐ Express Abandonment Request
- ☐ Information Disclosure Statement
- ☐ Certified Copy of Priority Document(s)
- ☐ Response to Missing Parts/ Incomplete Application
  - ☐ Response to Missing Parts under 37 CFR 1.52 or 1.53

- ☐ Assignment Papers (for an Application)
- ☐ Drawing(s)
- ☐ Licensing-related Papers
- ☐ Petition Routing Slip (PTO/SB/69) and Accompanying Petition
- ☐ Petition to Convert to a Provisional Application
- ☐ Power of Attorney, Revocation Change of Correspondence Address
- ☐ Terminal Disclaimer
- ☐ Small Entity Statement
- ☐ Request for Refund

- ☐ After Allowance Communication to Group
- ☐ Appeal Communication to Board of Appeals and Interferences
- ☐ Appeal Communication to Group (Appeal Notice, Brief, Reply Brief)
- ☐ Proprietary Information
- ☐ Status Letter
- ☒ Additional Enclosure(s) (please identify below):

Petition to Withdraw Holding of Abandonment receipt acknowledgment postcard

### Authorization to Charge Deposit Account

Please charge Deposit Account No. 50-0893 for any additional fees associated with this paper or during the pendency of this application, including any extensions of time for consideration of the documents enclosed.

Remarks

## SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm or Individual name

Tom Hunter, Reg. No. 38,498,

Quine Intellectual Property Law Group P.C.

Signature

*Tom Hunter*

Date

July 11, 2005

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Typed or printed name

Chianti Appling

Signature

*Chianti Appling*

Date

7/11/05

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QUINE INTELLECTUAL PROPERTY LAW GROUP, P.C.

By: 

Chianti Apple



Attorney Docket No: 407T-103300US  
Client Ref: 2001-217-1

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re application of:

Werner G. Kuhr, et al.

Application No.: 10/046,499

Filed: October 26, 2001

For: **MOLEHOLE EMBEDDED 3-D  
CROSSBAR ARCHITECTURE USED IN  
ELECTROCHEMICAL MOLECULAR  
MEMORY DEVICE**

Examiner: Gregg Cantelmo

Art Unit: 1745

**PETITION TO WITHDRAW  
HOLDING OF ABANDONMENT**

Mail Stop Petitions  
Commissioner for Patents  
PO Box 1450  
Alexandria, VA 22313-1450

Dear Sir:

This petition is filed in response to a Notice of Abandonment dated May 16, 2005 for the above-referenced application. As this petition is filed within two months of the Notice of Abandonment, this petition is timely filed under 37 C.F.R. § 1.181(f).

The Notice of Abandonment indicated that the application was abandoned for failure to timely file corrected drawings. Applicants petition for withdrawal of the Notice of Abandonment on the ground that Applicants filed a Response on February 17, 2004 which included corrected drawings, together with a request for a four-month extension of time.

More specifically, the following documents (copies of which are enclosed) were mailed to the U.S. Patent and Trademark Office in response to the Office Action dated August 14, 2003:

- 1) A Transmittal;
- 2) A Response;
- 3) Corrected Drawing Figures 3-5
- 4) A Request for Extension of Time; and

5) A Return Receipt Postcard.

As indicated in the signed Certificate of Mailing on these documents, these documents were deposited with the U.S. Postal Service as First Class Mail on February 17, 2004 in accordance with 37 C.F.R. § 1.8. The envelope included sufficient postage, as evidenced by the fact that the envelope was not returned to Applicants' Attorney for insufficient postage.

Accordingly, the attached documents should be considered timely filed and that the present application should be reinstated. Withdrawal of the holding of abandonment and consideration of the attached response is respectfully requested.

If it is determined that this petition cannot be granted, the Examiner is requested to telephone the undersigned at (510) 769-3513.

QUINE INTELLECTUAL PROPERTY  
LAW GROUP, P.C.  
P.O. BOX 458  
Alameda, CA 94501  
Tel: 510 337-7871  
Fax: 510 337-7877

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Tom Hunter", with a stylized flourish at the end.

Tom Hunter  
Reg. No: 38,498

TO THE U.S. PATENT & TRADEMARK OFFICE

Please stamp the date of receipt of the following document(s) and return this card to u:

RE: Response to Office Action for MOLEHOLE EMBEDDED 3-D CROSSBAR  
ARCHITECTURE USED IN ELECTROCHEMICAL MOLECULAR MEMORY  
DEVICE

TITLE OF DOCUMENT(S):

- Transmittal
- Amendment
- Drawing Figures 3-5
- Marked Up Copies of Drawings 3-5 (Showing Changes)
- Request for extension of time



Application No. 10/046,499

File No. 407T-103300US

Date Due November 14, 2004

Date Mailed February 17, 2004

Atty/Secty. TH:ca

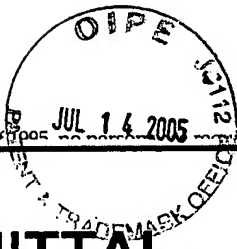
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Quine Intellectual Property Law Group, P.C.  
2033 Clement Ave., Suite 200  
Alameda, CA 94501



# TRANSMITTAL FORM

(to be used for all correspondence after initial filing)

<b>TRANSMITTAL FORM</b> (to be used for all correspondence after initial filing)	<b>Application Number</b>	10/046,499
	<b>Filing Date</b>	October 26, 2001
	<b>First Named Inventor</b>	Werner G. Kuhr
	<b>Group Art Unit</b>	2811
	<b>Examiner Name</b>	Unassigned
<b>Total Number of Pages in This Submission</b>		<b>Attorney Docket Number</b> 407T-103300US

## ENCLOSURES (check all that apply)

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<b>Remarks</b>		

## SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm or Individual name	Tom Hunter, Reg. No. 38,498, Quine Intellectual Property Law Group P.C.
Signature	
Date	February 17, 2004

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Typed or printed name	Chianti Appaling	Date	2/17/04
Signature			

**PETITION FOR EXTENSION OF TIME UNDER 37 CFR 1.136(a)**

Docket Number (Optional)  
407T-103300US

In re Application of Werner G. Kuhr, et al.

Application Number: 10/046,499

Filed: October 26, 2001

For MOLEHOLE EMBEDDED 3-D CROSSBAR ARCHITECTURE  
USED IN ELECTROCHEMICAL MOLECULAR MEMORY DEVICE

Group Art Unit 2811

Examiner Unassigned

This is a request under the provisions of 37 CFR 1.136(a) to extend the period for filing a response in the above-identified application.

The requested extension and appropriate non-small-entity fee are as follows  
(check time period desired):

☐ One month (37 CFR 1.17(a)(1)) \$ 110

☐ Two months (37 CFR 1.17(a)(2)) \$ 410

☒ Three months (37 CFR 1.17(a)(3)) \$ 930

☐ Four months (37 CFR 1.17(a)(4)) \$1450

☐ Five months (37 CFR 1.17(a)(5)) \$1970

☒ Applicant is a small entity under 37 CFR 1.9 and 1.27, therefore the fee amount shown above is reduced by one-half, and the resulting fee is: \$ 465.00.

A small entity statement under 37 CFR 1.27:

☐ is enclosed.

☐ has already been filed in this application.

☐ A check in the amount of the fee is enclosed.

☐ The Commissioner has already been authorized to charge fees in this application to a Deposit Account.

☒ The Commissioner is hereby authorized to charge any fees that may be required, or credit any overpayment, to Deposit Account Number 50-0893. *I have enclosed a duplicate copy of this sheet.*

I am the ☐ assignee of record of the entire interest.

☐ applicant.


☒ attorney or agent of record.

☐ attorney or agent under 37 CFR 1.34(a)

Registration number if acting under 37 CFR 1.34(a). \_\_\_\_\_

February 17, 2004

Date

  
Signature

Tom Hunter, 38,498

Typed or printed name and Reg. No.

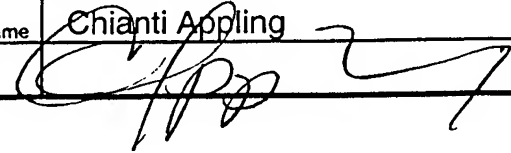
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Printed Name

Chianti Appling

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February 17, 2004  
QUINE INTELLECTUAL PROPERTY LAW GROUP, P.C.

By:   
Chanté Appling

Atty Docket No: 407T-103300US  
Client Ref: UC 2000-217-1

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re application of:

**WERNER G. KUHR, DAVID F. BOCIAN,  
ZHIMING LIU, and AMIR YASSERI**

Application No.: 10/046,499

Filed: 10/26/2001

For: **MOLEHOLE EMBEDDED 3-D  
CROSSBAR ARCHITECTURE USED IN  
ELECTROCHEMICAL MOLECULAR  
MEMORY DEVICE**

Examiner: Gregg Cantelmo

Art Unit: 1745

**AMENDMENT**

Assistant Commissioner for Patents  
Washington, D.C. 20231

**INTRODUCTORY COMMENTS**

Dear Sir:

In response to the Office Action dated August 14, 2003, Applicants respectfully request reconsideration of the above-identified application in view of the following amendments and remarks.

The following documents are enclosed herewith:

- 1) A petition to extend the period of response for three months; and
- 2) Replacement (amended) drawings (Figures 3-5) and "marked up" copies of drawings showing changes made.

Please amend the specification and/or claims as shown herein.



**AMENDMENTS TO THE SPECIFICATION**

At pages 24-25, please amend paragraph [0118] as follows:

[0001] Where the electrodes comprise a group IV element (*e.g.* silicon, germanium, *etc.*) the molecules are readily coupled to the surface if provided with either a thiol group or an alcohol or with a linker comprising a thiol group or an alcohol. Methods of coupling a molecule comprising an alcohol or a thiol to a group IV element are described in copending application USSN 20030081463 A1 entitled FORMATION OF SELF-ASSEMBLED MONOLAYERS ON SILICON SUBSTRATES, filed on October 26, 2001. Basically, the method involves halogenating the group IV element surface; providing a solution comprising the molecule to be coupled to the surface where the is alcohol terminated (*e.g.*, terminated with an alcohol selected from the group consisting of a primary alcohol, a secondary alcohol, a tertiary alcohol, a benzyl alcohol, and an aryl alcohol) or thiol terminated (*e.g.*, a primary thiol, a secondary thiol, a tertiary thiol, a benzyl thiol, an arylthiol, *etc.*) and present in a solvent and said alcohol-terminated organic molecule is in a solvent (*e.g.*, mesitylene, durene, o-dichlorobenzene, 1,2,4,-trichlorobenzene, 1-chloronaphthalene, 2-chloronaphthalene, N,N-dimethylformamide, N,N-dimethylacetamide, N,N-dimethylpropionamide, benzonitrile, anisole, *etc.*); and contacting the solution with the group IV element surface under conditions where the solvent is rapidly removed from the surface whereby the organic molecule is coupled to said surface through an E-O- or an E-S- bond where E is the group IV element (*e.g.* silicon, germanium, doped silicon, doped germanium, *etc.*). The reaction is preferably performed in the presence of a base (*e.g.* 2,4,6-collidine, 2,6-lutidine, 2,6-di-*tert*-butylpyridine, 4-dimethylaminopyridine, trimethylamine, triethylamine, tributylamine, N,N-diisopropylethylamine, 1,8-bis(dimethylamino)naphthalene, 1,5-diazabicyclo[4.3.0]non-5-ene, 1,8-diazabicyclo[5.4.0]undec-7-ene, Na<sub>2</sub>CO<sub>3</sub>, NH<sub>3</sub>. *etc.*). Typically the surface is heated to a temperature of at least about 70°C.

AMENDMENTS TO THE CLAIMS

Claims 1-32 (Canceled).

Claim 1 (Currently amended): A molecular memory, said memory comprising an electrochemical cell array, said cell array comprising a plurality of nanoscale electrochemical cells wherein a cell comprising said memory is a well having a cross-sectional area less than about ~~typically less than~~ 1 micron by 1 micron; wherein a wall of said well comprises a first electrode and a second electrode said first electrode and said second electrode separated by a non-conductor or semi-conductor, wherein the ratio of the surface area of said first electrode exposed to the interior of said well to the surface area of said second electrode exposed to the interior of said well is at least about 2:1; and wherein a redox-active molecule is electrically coupled to said second electrode.

Claim 2 (Original): The memory of claim 1, wherein said redox-active molecule is a molecule selected from the group consisting of a porphyrinic macrocycle, a metallocene, a linear polyene, a cyclic polyene, a heteroatom-substituted linear polyene, a heteroatom-substituted cyclic polyene, a tetrathiafulvalene, a tetraselenafulvalene, a metal coordination complex, a buckyball, a triarylamine, a 1,4-phenylenediamine, a xanthene, a flavin, a phenazine, a phenothiazine, an acridine, a quinoline, a 2,2'-bipyridyl, a 4,4'-bipyridyl, a tetrathiotetracene, and a peri-bridged naphthalene dichalcogenide.

Claim 3 (Original): The memory of claim 2, wherein said redox-active molecule is a molecule selected from the group consisting of a porphyrin, an expanded porphyrin, a contracted porphyrin, a ferrocene, a linear porphyrin polymer, a porphyrin sandwich complex, and a porphyrin array.

Claim 4 (Original): The memory of claim 3, wherein said organic molecule comprises a porphyrinic macrocycle substituted at a  $\beta$ - position or at a *meso*- position.

Claim 5 (Original): The memory of claim 1, wherein said ratio is predetermined.

Claim 6 (Original): The memory of claim 1, wherein said ratio is at least about 5:1.

Claim 7 (Original): The memory of claim 1, wherein said well has a volume less than about 10 femtoliters ( $10 \times 10^{-15}$  L).

Claim 8 (Original): The memory of claim 1, wherein said array comprises at least 100 wells.

Claim 9 (Original): The memory of claim 1, wherein the center to center distance between two wells comprising said memory is about 250 nm or less.

Claim 10 (Original): The memory of claim 1, wherein a plurality of the cells comprising said memory are independently addressable.

Claim 11 (Original): The memory of claim 1, wherein said first electrode comprises all the walls comprising said well except the bottom wall and, if present, a top wall.

Claim 12 (Original): The memory of claim 1, wherein said first electrode and said second electrode comprises all the walls comprising said well except the bottom wall and, if present, a top wall.

Claim 13 (Original): The memory of claim 1, wherein said first and said second electrode are independently selected from the group consisting of copper, silver, gold, platinum, a conducting polymer, aluminum, silicon, germanium, gallium arsenide, ruthenium, titanium and tantalum.

Claim 14 (Original): The memory of claim 1, wherein said first electrode is a semiconductor.

Claim 15 (Original): The memory of claim 1, wherein said insulator or semiconductor is an insulator.

Claim 16 (Original): The ~~electrochemical cell array~~ memory of claim 15, wherein said insulator is selected from the group consisting of silicon dioxide, silicon nitride.

Claim 17 (Currently amended): The ~~electrochemical cell array~~ memory of claim 1, wherein said first electrode is a silver electrode, said second electrode is a gold electrode.

Claim 18 (Currently amended): The ~~electrochemical cell array~~ memory of claim 17, wherein said array is formed on a silicon substrate.

Claim 19 (Currently amended):      The ~~electrochemical cell array~~ memory of claim 17, wherein a plurality of the cells of said memory are independently ~~addressable~~ addressed.

Claims 20 -117 (Canceled).

## **REMARKS**

### **Status of the Claims.**

Claims 33-51 are pending with entry of this amendment, claims 1-32 and 52-117 being cancelled and no being added herein. Claims 33, 49, 50, and 51 are amended herein. These amendments introduce no new matter. The amendment of claim 33 is made simply eliminate the term "typically". The amendments of claims 49, 50, and 51 are made so that the claims are consistent in form to the parent claim (claim 33).

### **Election/Restriction.**

Pursuant to a restriction requirement made final, Applicants cancel claims 71-117 with entry of this amendment. Please note, however, that Applicants reserve the right to file subsequent applications claiming the canceled subject matter and the claim cancellations should not be construed as abandonment or agreement with the Examiner's position in the Office Action.

### **Information Disclosure Statement.**

Applicants note with appreciation the Examiner's thorough consideration of the references cited in the Information Disclosure Statement (Form 1449) submitted on January 2, 2003.

### **Drawings.**

The drawings were objected to because the reference characters "14" in Figure 3 and "20" in Figure 2 were allegedly both used to designate the organic molecules. In addition, the drawings were objected to because reference character "14" was allegedly used to designate both an electrode conductor and the organic molecule in Figure 2-5. A drawing correction is made with entry of this amendment thereby obviating these objections.

### **Specification.**

The specification was objected to because in paragraph [0118] reference was made to a copending application, but did not provide an application number. Paragraph [0118] is amended herein obviating this objection.

It is noted that the title and filing date of the application was provided and this is sufficient to uniquely identify the application. Accordingly, the amendment providing the serial number introduces no new matter.

**Claim Objections.**

Claim 61 was objected to because the term "about t" should be --about--. Claim 61 is canceled thereby obviating this objection.

Claims 9, 32, 51, and 62 were objected to under 37 C.F.R. §1.75(c) as allegedly failing to further limit the subject matter of a previous claim. Claim 51 has been amended herein to replace the term 'independently addressable' to --independently addressed-- thereby providing further structure defining the products. In addition, claims 9, 32, and 62 are canceled. Accordingly, the objection to claims 9, 32, 51, and 62 should be withdrawn.

**35 U.S.C. §112, Second Paragraph.**

Claims 16, 22-24, 33-51, 67, and 68 were rejected under 35 U.S.C. §112, second paragraph, as allegedly indefinite for various reasons as explained below:

a) Claim 16 allegedly lacked antecedent basis for the limitation "said insulator" in line 1. Claim 16 is canceled thereby obviating this rejection.

b) Claims 22 and 23 allegedly lacked antecedent basis for the limitation "said redox-active molecule". Claims 22 and 23 are canceled thereby obviating this rejection.

c) Claim 24 allegedly lacked antecedent basis for the limitation "said organic molecule". Claim 24 is canceled thereby obviating this rejection.

d) Claim 33 was allegedly indefinite because of the recitation of the phrase "typically about". Claim 33 is amended herein to recite ". . . having a cross-sectional area less than about 1 micron by 1 micron;" thereby obviating this rejection.

**Allowable subject matter.**

The Examiner indicated that claim 33 would be allowable if rewritten or amended to overcome the rejection under 35 U.S.C. §112, second paragraph. Moreover, the Examiner indicated that "none of the prior art of record are considered to teach, suggest, or render obvious the invention of claim 33."

Applicants have amended claim 33 to obviate the rejection under 35 U.S.C. §112, second paragraph and accordingly believe this claim is allowable. Moreover, since claims 34-51

depend from claim 33 and thereby incorporate all the limitations of claim 33, Applicants believe these claims are also free of the prior art of record and consequently are allowable.

**35 U.S.C. §102 and §103.**

The Examiner made a number of rejections of claims 1-32, and 52-70 under 35 U.S.C. §§102 and 103(a). Applicants have canceled these claims with entry of this amendment thereby obviating these rejections.

Please note, however, that Applicants reserve the right to file subsequent applications claiming the canceled subject matter and the claim cancellations should not be construed as abandonment or agreement with the Examiner's position in the Office Action.

In view of the foregoing, Applicants believes all claims now pending in this application are in condition for allowance. The issuance of a formal Notice of Allowance at an early date is respectfully requested. Should the Examiner seek to maintain the rejections, Applicants request a telephone interview with the Examiner and the Examiner's supervisor.

If a telephone conference would expedite prosecution of this application, the Examiner is invited to telephone the undersigned at (510) 769-3513.

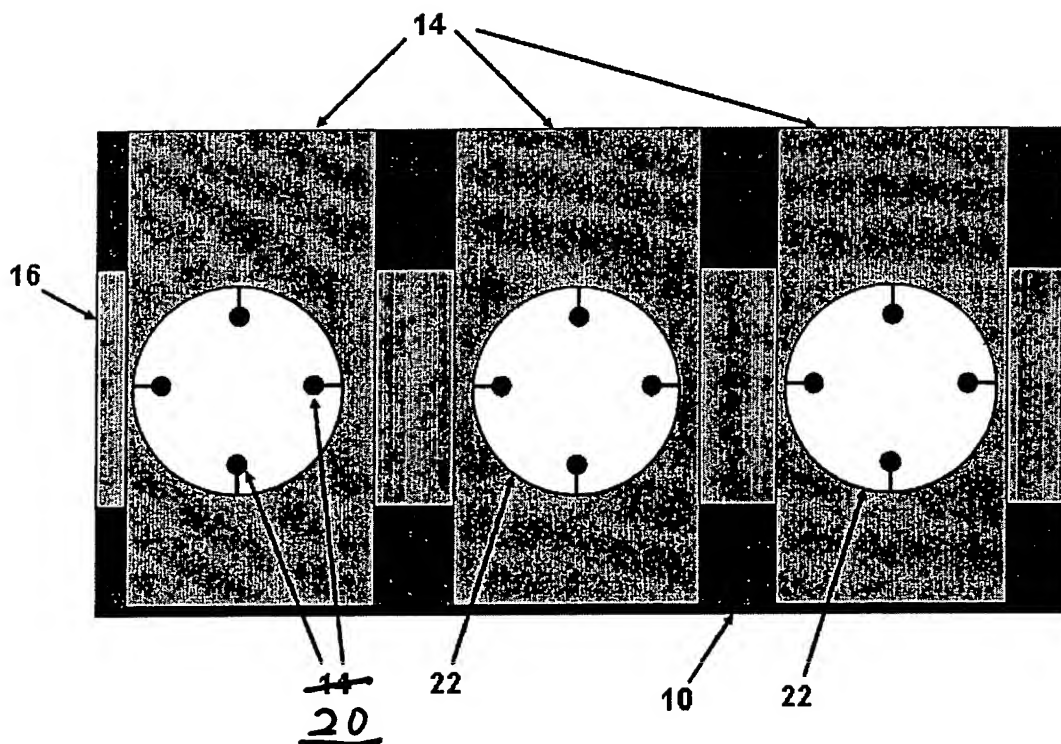
QUINE INTELLECTUAL PROPERTY LAW  
GROUP, P.C.  
P.O. BOX 458  
Alameda, CA 94501  
Tel: 510 337-7871  
Fax: 510 337-7877

Respectfully submitted,



Tom Hunter  
Reg. No: 38,498

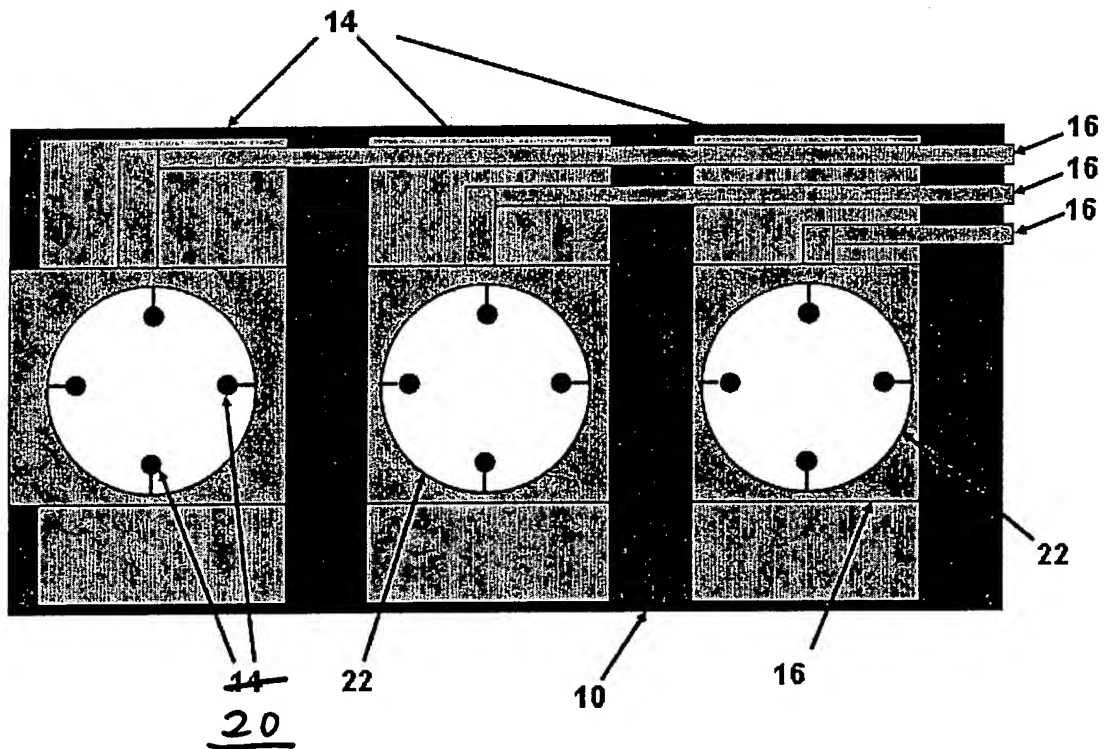
MARKED UP COPY OF FIGURE



**Fig. 3**

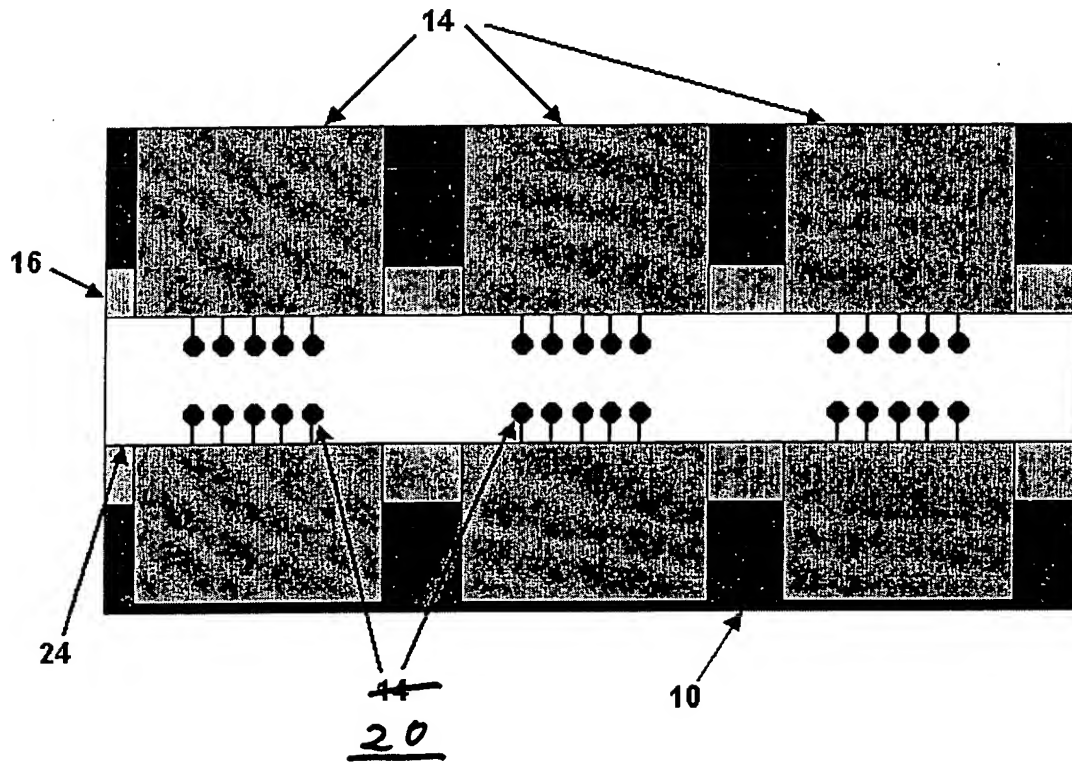


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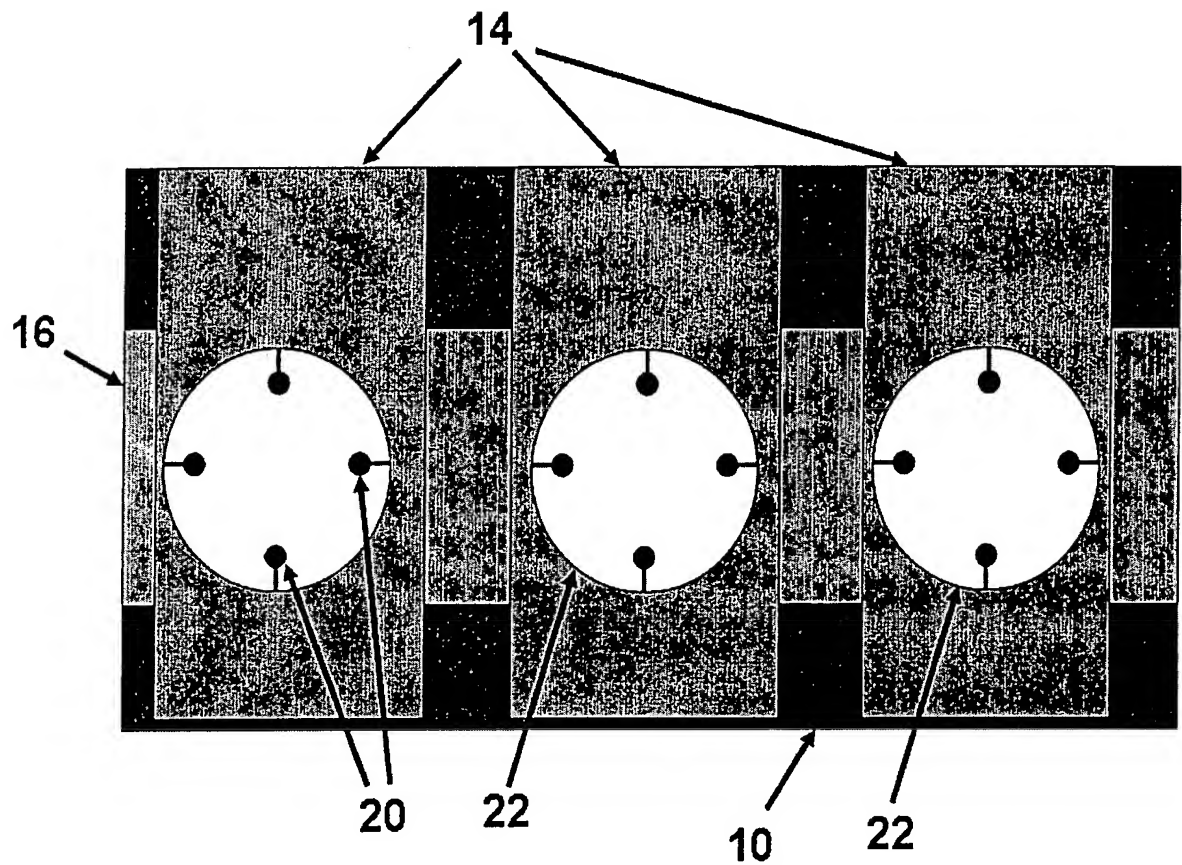


**Fig. 4**

MARKED UP COPY OF FIGURE



**Fig. 5**



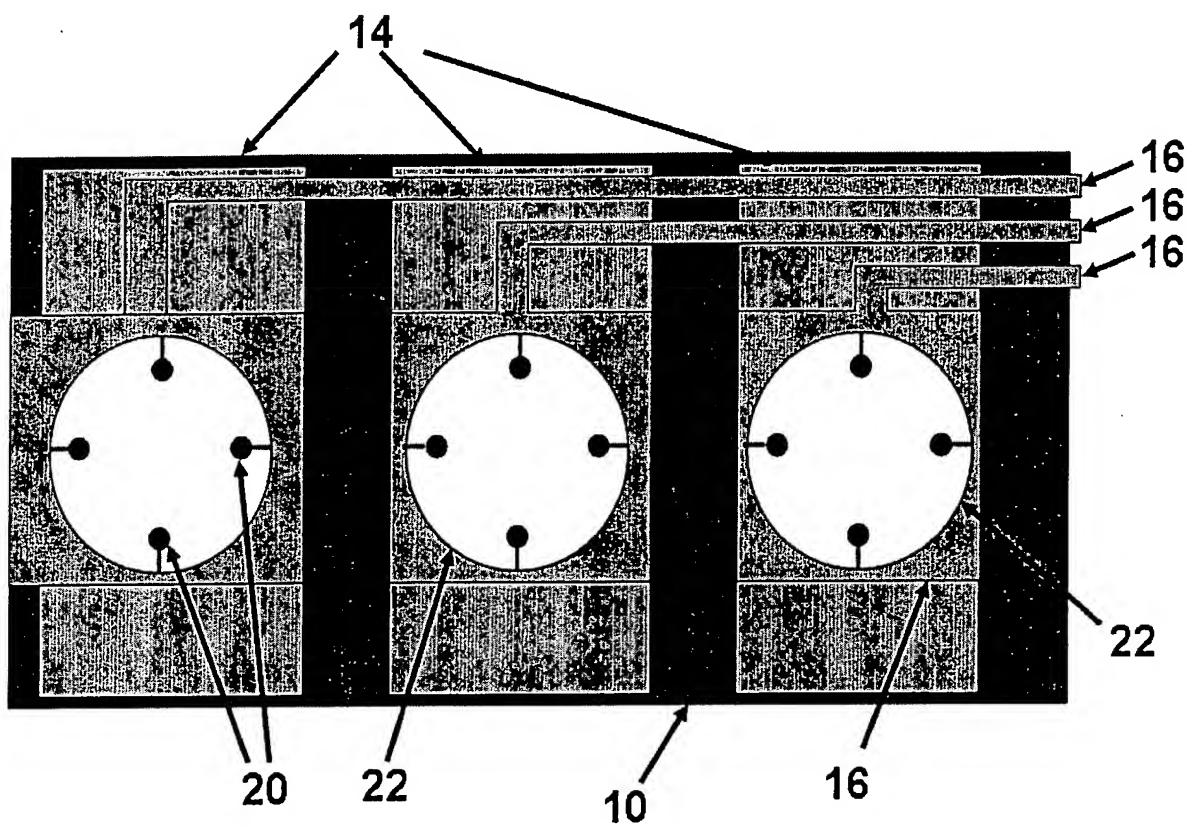
**Fig. 3**

Molehole Embedded 3-D Crossbar Architecture Used In Electrochemical Molecular Memory Device

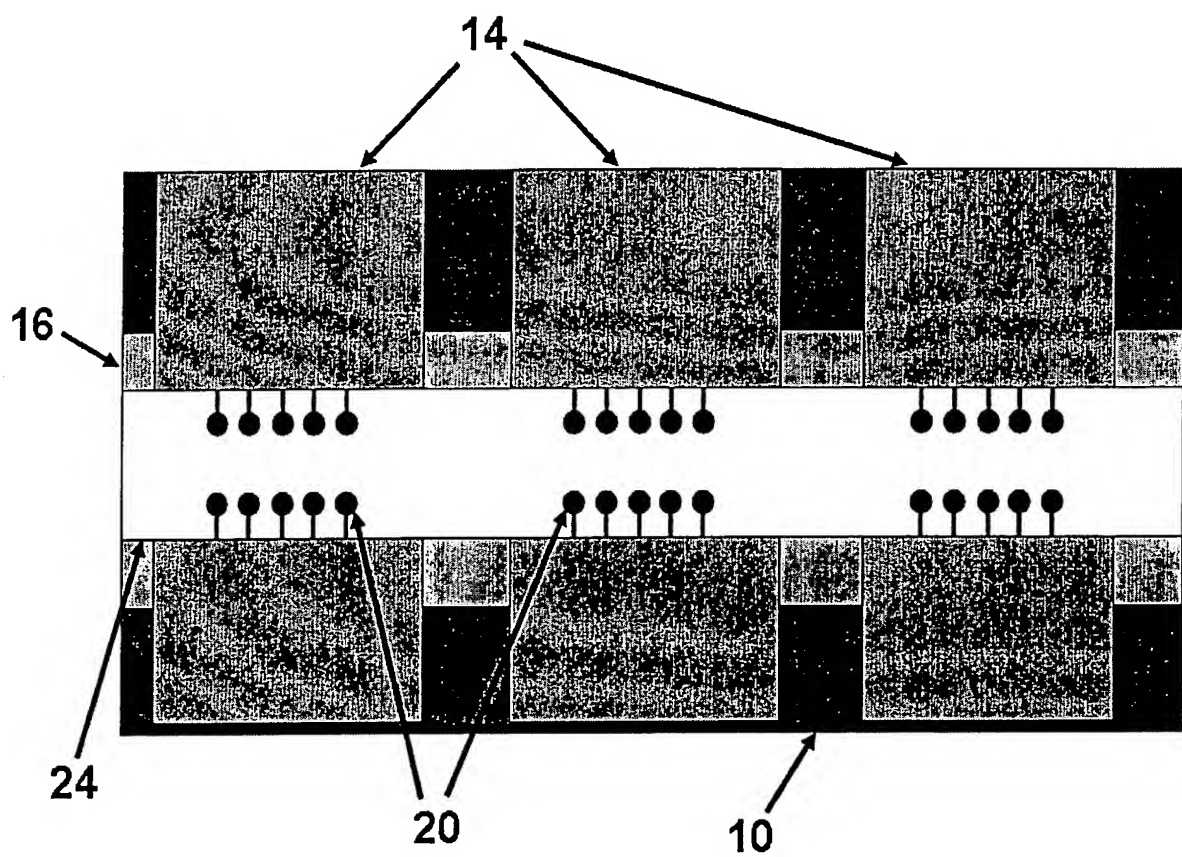
Inventors: Kuhr *et al.*

Serial No: 10/046,499

Docket No: 407T-103300US



**Fig. 4**



**Fig. 5**

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